MEETING HANDOUTS

Enclosure 3

"Class of '03"
License Renewal Application Standardization Meeting

(October 9, 2002)

- LRA Section 3 Proposal -

Proposed Standard LRA Section 3 Tables

- Two Table Types
  - SRP-style table
  - Summary of aging management evaluations table (9 columns)

Proposed Standard LRA Section 3 Tables (cont'd.)

- SRP Style Table
  - Uses format suggested by the SRP
  - Item number column added to facilitate cross-referencing between Chapter 3 tables
  - Discussion column added for clarifications and explanations.

Proposed Standard LRA Section 3 Tables (cont'd.)

- Summary of Aging Management Evaluation Table
  - Individual table for each system/structural group/ commodity
  - Table includes:
    - component type
    - intended function
    - material
    - environment
    - aging effects requiring management
    - NUREG-1801 item references
    - SRP-LR item references
    - aging management programs
    - standard and plant-specific note (explanation) references

Proposed Standard LRA Section 3 Tables (cont'd.)

- Features
  - SRP-style table aligns with NUREG 1801/SRP to aid SER development
  - Both tables facilitate "hyper linking" to references
  - Evaluation summary table is cross-referenced to the SRP-style table
  - Tables are divided into the six NUREG-1801/SRP groups (i.e., RCS, ESF, auxiliary systems, SPCS, structures, EI&C)
  - Evaluation summary table is sorted by system per NUREG-1801
  - Component types are sorted alphabetically in summary table

Proposed Standard LRA Section 3 Tables (cont'd.)

- Example of SRP-Style Table (PWR):

Table 3.2.1 Summary of Aging Management Evaluation s in Chapter V of NUREG-1801 For Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-01	Piping, fittings, and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA (see Subsection 3.2.2.2.1)	Low temperature systems are not susceptible to cumulative fatigue damage, for example core flood.
3.2.1-03	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to general corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.2.2)	Not applicable, as carbon steel is not used for these components.
3.2.1-05	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.3 2)	Applicable to containment isolation components only.

Proposed Standard LRA Section 3 Tables (cont'd.)

- **Example: comparison of NUREG -1801 table to SRP-style table (SRP-LR)**
  - Slides 8 & 9 show the first page of Table 2 from NUREG-1801 (page split among two slides for readability)
  - Slide 6 shows the SRP-style table (SRP-LR)
  - Item Number from SRP-style table aligns with NUREG-1801 table
    - Item 3.2.1-01 of the SRP-style table (slide 6) aligns with the first row of NUREG-1801 table on slide 8 and 3.2.1-03 aligns with the third row of NUREG-1801.
    - Item 3.2.1-05 of SRP-style table (slide 6) aligns with the fifth row of NUREG-1801 table, which is the second row down on the continuation of NUREG-1801 table shown on slide 9.

Proposed Standard LRA Section 3 Tables (cont'd.)

- **Example - GALL Vol. 1 Table:** (page 16 of NUREG-1801, Vol. 1)

Table 2. Summary of Aging Management Programs for Engineered Safety Features Evaluated in Chapter V of the GALL Report

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Required	Item Number in GALL
BWR/ PWR	Piping, fittings, and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	V.D1.1-c, V.D1.4-a, V.D2.1-b.
BWR	Piping, fittings, pumps and valves in emergency core cooling system	Loss of material due to general corrosion	Water Chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	V.D2.1-a, V.D2.2-a, V.D2.3-b.
BWR/ PWR	Components in containment spray (PWR only), standby gas treatment system (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to general corrosion	Plant specific	Yes, plant specific	V.A.2-a, V.A.5-a, V.B.1-a, V.B.2-a, V.C.1-a, V.D2.1-e, V.D2.5-a.

Proposed Standard LRA Section 3 Tables (cont'd.)

- **Example - GALL Vol. 1 Table (continued):** (page 16)

BWR	Piping, fittings, pumps, and valves in emergency core cooling system	Loss of material due to pitting and crevice corrosion	Water chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	V.D2.1-a, V.D2.2-a, V.D2.3-b.
BWR/ PWR	Components in containment spray (PWR only), standby gas treatment system (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific	V.C.1-a, V.C.1-b, V.D1.8-c, V.D2.1-e.
BWR/ PWR	Containment isolation valves and associated piping	Loss of material due to microbiologically influenced corrosion (MIC)	Plant specific	Yes, plant specific	V.C.1-a, V.C.1-b.
BWR	Seals in standby gas treatment system	Changes in properties due to elastomer degradation	Plant specific	Yes, plant specific	V.B.1-b, V.B.2-b.

Proposed Standard LRA Section 3 Tables (cont'd.)

- Example of Evaluation Summary Table (PWR):

Table 3.2.2-1 Engineered Safety Features – Containment Spray System – Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Bolting	Pressure boundary	Carbon steel	Air (external)	Loss of material	VA.1-b VA.3-b VA.4-b VA.5-b VA.6-d (A.6.5)	3.2.1-17	Boric acid corrosion	1
				Loss of material	VE.1-b	3.2.1-10	System walkdown	1
				Loss of mechanical closure integrity			Boric acid corrosion System walkdown	5
		Stainless steel	Air (external)	None			None	4
Eductor	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A

Proposed Standard LRA Section 3 Tables (cont'd.)

- **Example: Linkage of Evaluation Summary Table to SRP-style table (SRP-LR)**
  - Slide 12 shows the beginning of the second page of Table 2 from NUREG-1801 (only first four rows for readability = rows 8, 9, 10 & 11).
  - Slide 10, second row under bolting were "Aging Effect Requiring Management" that starts with "Loss of Material", shows 3.2.1-10 being referenced under "SRP-LR Item" column. This means that this component type, aging effect, and aging management program, align with NUREG-1801, Volume 1 table.
  - SRP-LR item 3.2.1-10 aligns with the third row down (row 10) on slide 12.

Proposed Standard LRA Section 3 Tables (cont'd.)

- **Example - GALL Vol. 1 Table:** (page 17 of NUREG-1801, Vol. 1)

Table 2. Summary of Aging Management Programs for Engineered Safety Features Evaluated in Chapter V of the GALL Report (continued)

Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Required	Item Number in GALL
PWR	High pressure safety injection (charging) pump miniflow orifice	Loss of material due to erosion	Plant specific	Yes, plant specific	V.D1.2-c.
BWR	Drywell and Suppression chamber spray system nozzles and flow orifices	Plugging of flow orifice and spray nozzles by general corrosion products	Plant specific	Yes, plant specific	V.D2.5-b.
BWR/ PWR	External surface of carbon steel components	Loss of material due to general corrosion	Plant specific	Yes, plant specific	V.E.1-b.
BWR/ PWR	Piping and fittings of CASS in emergency core cooling system	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	V.D1.1-b, V.D2.1-d.

Proposed Standard LRA Section 3 Tables (cont'd.)

- NOTES: **Notes column refers reviewer to standard or plant specific notes**

Table 3.2.2-1 Engineered Safety Features – Containment Spray System – Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Bolting	Pressure boundary	Carbon steel	Air (external)	Loss of material	VA.1-b VA.3-b VA.4-b VA.5-b VA.6-d (A.6.5)	3.2.1-17	Boric acid corrosion	1
				Loss of material	VE.1-b	3.2.1-10	System walkdown	1
				Loss of mechanical closure integrity			Boric acid corrosion System walkdown	5
		Stainless steel	Air (external)	None			None	4
Eductor	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A

Proposed Standard LRA Section 3 Tables (cont'd.)

- **Standard notes (numeric):**

  1. Consistent with NUREG-1801 item for component, material, environment, aging effect and aging management program.
  2. Component is different, but consistent with NUREG-1801 item for material, environment, aging effect and aging management program.
  3. Material not in NUREG-1801 for this component.
  4. Environment not in NUREG-1801 for this component and material.
  5. Aging effect not in NUREG-1801 for this component, material and environment combination.

Proposed Standard LRA Section 3 Tables (cont'd.)

- **Plant specific notes - unique to the plant (alphabetical):**

  A. System temperature is below the threshold for cracking.

  B. Fouling is not restricted to biofouling.

  C. NUREG-1801 differentiates between open and closed systems; however, both have borated water internally.

  D. Material, environment and aging effect are consistent with NUREG-1801, but a different aging management program is used.

  E. Component type, material, environment and aging effect combination are not in NUREG-1801, but the aging management program in NUREG-1801 is used.

Proposed Standard LRA Section 3 Body

- Contains:
  - Introduction to Section 3, (3.0) including:
    - Road map to supporting LRA sections
    - The identification of the Internal Service Environments and External Service Environments to which the SSC's that are subject to AMR are exposed
    - Other information deemed pertinent by the applicant

Proposed Standard LRA Section 3 Body

- Contains:
  - Six subsections (3.1 - 3.6) addressing aging management of the major structures and components groups
    - 3.1 = RCS
    - 3.2 = ESF
    - 3.3 = Auxiliary Systems
    - 3.4 = Steam and Power Conversion Systems
    - 3.5 = Containments, Structures and Supports
    - 3.6 = Electrical and Instrumentation & Controls

Proposed Standard LRA Section 3 Body

- Each subsection contains AMR results further divided into 4 subsections:
  - Scope
  - Results
  - Conclusions
  - References

Proposed Standard LRA Section 3 Body

- Scope:
  - Systems, structures, components addressed by the subsection
  - SRP-LR table
  - General information that is applicable to the entire subsection

Proposed Standard LRA Section 3 Body

- Results:
  - AMR results tables (9 - column format)
    - Listed by system
  - Identification of Aging Management Programs (AMPs) relied on by the SSCs within the subsection scope
  - Disposition of all "Further Evaluation Required" items applicable to the subsection SSCs
  - Identification of applicable TLAAs associated with the subsection SSCs

Proposed Standard LRA Section 3 Body

- Conclusion:
  - General conclusion regarding the ability of the selected AMPs to manage the effects of aging on the SSCs within the scope of the subsection

Proposed Standard LRA Section 3 Body

- References:
  - List of all references associated with the subsection

Proposed Standard LRA Section 2 Subsection

- Focus = “system” section:
  - Divided into 4 subsections:
    - “System” description
    - FSAR references
    - License renewal drawings
    - Components subject to AMR

Proposed Standard LRA Section 2 Subsection

- “System” Description:
  - Description of the system, structures or commodities within the scope of the subsection
    - Example: containment spray system, safety injection system, etc.

Proposed Standard LRA Section 2 Subsection

- (U)FSAR References:
  - Section of the (U)FSAR where additional details of the subject system, structures or commodities can be found

Proposed Standard LRA Section 2 Subsection

- License renewal drawings:
  - Listing of all license renewal drawings that are applicable to the subsection

Proposed Standard LRA Section 2 Subsection

- Components subject to AMR:
  - Table which contains all component types within the subsection that are subject to AMR

Proposed Standard LRA Integrated Example

- Example:
  - Engineered Safety Features - focusing on the containment spray system

2.0 SCOPING AND SCREENING METHODOLOGY FOR IDENTIFYING STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW AND IMPLEMENTATION RESULTS

2.3 SCOPING AND SCREENING RESULTS: MECHANICAL SYSTEMS

2.3.2 ENGINEERED SAFETY FEATURES SYSTEMS

2.3.2 1 CONTAINMENT SPRAY (CS)SYSTEM

System Description

The purpose of the Containment Spray (CS) system is to limit the containment pressure and temperature after a Loss-of-Coolant Accident (LOCA) or Main Steam Line Break (MSLB) accident and thus reduce the possibility of leakage of airborne radioactivity to the outside environment. The CS system, in conjunction with the containment air recirculation and cooling system, provides sufficient heat removal capability to limit the post-accident containment pressure and structural temperature below the design values of 54 psig and 289 °F, respectively.

The CS system initially draws borated treated water from the Refueling Water Storage Tank (RWST). The treated water flows through the CS pumps, shutdown cooling heat exchangers and interconnecting piping to the spray nozzles. When the RWST reaches a preset low level, the CS system draws off the containment sump through the CS pumps, shutdown cooling heat exchangers, and interconnecting piping to the spray nozzles. The CS nozzles direct sprays of cooled borated water downward from the upper regions of the containment to cool and depressurize the containment building.

The portions of the CS system containing components subject to an AMR extend from the RWST and Containment Sump system to the spray nozzles.

FSAR References

Additional details of the CS system can be found in the FSAR, Section 6.4.

License Renewal Drawings

The license renewal drawings for the CS system are listed below:

25203-LR26015, Sh.1
25203-LR26015, Sh.2
25203-LR26015, Sh.3

Components Subject to AMR

The component types that require aging management review are indicated in Table Table 2.3 2-1, Engineered Safety Features - Containment Spray System.

Table 2.3.2-1 Engineered Safety Features - Containment Spray System

Component Type	Intended Function
Bolting	Pressure boundary
Eductor	Pressure boundary
Heat exchangers (shell)	Pressure boundary
Heat exchanger (tubes)	Heat transfer; Pressure boundary
Heater housing (RWT freeze protection)	Pressure boundary
Manifold (piping)	Pressure boundary
Orifice	Flow control, Pressure boundary
Piping	Pressure boundary
Pump casing	Pressure boundary
Spray nozzles	Flow control; Pressure boundary
Tanks	Pressure boundary
Thermowells	Pressure boundary
Tubing	Pressure boundary
Valve	Pressure boundary

2.3.2.2 SAFETY INJECTION (SI) SYSTEM

System Description

The purpose of the Safety Injection (SI) system is to provide a source of treated water to the reactor coolant system, in the event of a design basis accident, to ensure that there is an adequate shutdown margin and to cool the core.

The SI system consists of three sub-systems (1) High-Pressure Safety Injection (HPSI), (2) Low-Pressure Safety Injection (LPSI), and (3) Safety Injection Tank (SIT).

3.0 AGING MANAGEMENT REVIEW RESULTS

This section provides the results of the aging management review for those structures and components identified in Section 2.0 as being subject to aging management review. The methodology used for performing aging management reviews including the process for identifying the aging effects requiring management is explained in Appendix C, Aging Management Review Methodology.

Descriptions of the internal and external service environments which were used in the aging management review to determine aging effects requiring management are included in Table 3 0-1: Internal Service Environments and Table 3.0-2: External Service Environments. The environments used in the aging management reviews are listed in the Environment column and details related to the environment are provided in the Description column of these tables.

A listing of the abbreviations used in these tables is provided in Section 1.4 1.

Table 3.0-1 Internal Service Environments

Environment	Description
Air	Dry/filtered compressed air (identified as Dry Air), non-dried compressed air, and atmospheric air (when internal to components such as ventilation system components, components open to atmosphere, etc.). Moisture-laden air conditions are noted, when applicable.
Gas	Nitrogen, oxygen, hydrogen, carbon dioxide, helium, freon, or Halon gases. Also includes vent gases from process systems.
Lubricating Oil	All lubricating oils used for in-scope plant equipment.
Fuel Oil	All fuel oils used for in-scope plant equipment.
Raw Water[1]	From a river, lake, pond, or groundwater source. Raw water is not demineralized or chemically treated to any significant extent. In general, raw water is rough filtered to remove large particles. Biocides may be added to raw water to control micro-organisms or macro-organisms. Other designations of raw water include water that leaks from any system and condensation.
Sea Water[1]	Water from a bay, sound, or ocean source. Sea water is not demineralized or chemically treated to any significant extent. In general, sea water is rough filtered to remove large particles. Biocides may be added to sea water to control micro-organisms or macro-organisms.

Table 3.0-1 Internal Service Environments

Environment	Description
Treated water[1] Steam	Demineralized water or chemically purified water which is the source for water that may require further processing, such as for the primary or secondary coolant system. Treated water can be de-aerated, can include corrosion inhibitors, biocides, or boric acid, or can include a combination of treatments. Steam generated from treated water is included in this environment category. Examples of designations that are used to identify treated water in the Environment description sections of the aging management review results include: • treated water (borated water) - applies to primary systems water that is treated and monitored for quality under Primary Water Chemistry Aging Management Activity • treated water (component cooling) - applies to component cooling system water that is treated and monitored for quality under Closed-Cycle Cooling Water System Aging Management Activity • treated water (bearing cooling/chilled water) - applies to bearing cooling system and chilled water system water that is treated and monitored for quality under Closed-Cycle Cooling Water System Aging Management Activity • treated water (diesel cooling) - applies to local, self-contained diesel engine cooling water systems water that is treated and monitored for quality under Closed-Cycle Cooling Water System Aging Management Activity • treated water (secondary) - applies to secondary systems water that is within the scope of the Secondary Water Chemistry Aging Management Activity and controlled for protection of steam generators Other treated water applications use chemistry-controlled treated water as source water, but the water is not maintained as chemistry-controlled water.

1. While these are considered internal environments for plant systems, they may also be identified as external environments for certain structural members and system components that are submerged.

Table 3.0-2 External Service Environments

Environment[1]	Description
Air	Indoor air environments as described below: <u>Sheltered Air</u> - The sheltered air environment includes atmospheric air inside covered structures that provide protection from precipitation and wind. This environment is defined by a bulk average air temperature range of 40°F to 130°F and a 60-year maximum design ionizing dose of $3x10^7$ rads. <u>Containment Air</u> - The Containment air environment is defined by a bulk average air temperature range of 105°F to 120°F, except the pressurizer block house which can approach 150°F. Normal operating pressure is between -12 in. w.g. and 1.0 psig. The 60-year maximum design ionizing dose ranges between $6.6x10^5$ rads and $8.7x10^7$ rads. An exception is the area around the reactor vessel inside the primary shield wall for which the 60-year maximum design ionizing dose is $X.Xx10^9$ rads. <u>NOTES</u> 1.Certain structures or components may experience environmental conditions that deviate from the stated ranges or maximum values. The actual environmental condition(s) for these structures or components were used in the aging evaluation when the condition could affect the results, and, in those cases, the actual values are identified in the Environment description of the applicable LRA subsection. 2.Structural members may be associated with mechanical system components that may have the potential for condensation or intermittent wetting. Therefore, structural members have been conservatively assumed to be intermittently wetted in an air environment. 3.Mechanical components are assumed to be in an air environment that is not subject to intermittent wetting. Intermittently wetted conditions are noted, when applicable, such as from condensation.
Atmosphere / Weather	Air environment outside covered structures which includes precipitation and wind. Components and structures in this environment are subject to intermittent wetting. The outdoor air environment also includes exposure to ultraviolet radiation and ozone. This environment is bounded by a bulk average air temperature range of -5.1°F to 91°F and a 60-year maximum design ionizing dose of less than 150 rads.

Table 3.0-2 External Service Environments

Environment[1]	Description
Borated Water Leakage	The borated water leakage environment applies in all plant areas that include components and systems that contain borated water and that could leak on nearby components or structures. This environment is specified in the aging management review results only for materials susceptible to boric acid corrosion (carbon steel, low-alloy steels, and copper alloys). This environment is not considered for in-scope cables and connectors since cables are insulated, splices are sealed, and terminations are protected by enclosures.
Soil	The external environment for structures and components buried in the ground. Buried components (pipes and valves) are exposed to a soil environment and may be exposed to groundwater if they are located below the local groundwater elevation. The soil is assumed to entrain raw water and buried components are evaluated for the effects of corrosion. Concrete structural members below grade elevation are exposed to a soil environment and may be exposed to groundwater if they are located below the local groundwater elevation. The site groundwater is non-aggressive to concrete as determined by recent groundwater analyses (discussed in Appendix C). Steel piles are driven in undisturbed soil such that the soil environment surrounding the piles is deficient in oxygen at depths of a few feet below grade or below the water table. Therefore, the soil environment is not considered corrosive to steel piles (Reference 3.6-2, Section 3.5).

1. For certain structural members and system components that are submerged, the applicable environment identified in Table 3 0-1· Internal Service Environments, is specified in the aging management review results.

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES SYSTEMS

3.2.1 ~~SCOPE~~ Introduction

This section provides the results of the aging management review for those components identified in Section 2 3 2, Engineered Safety Features Systems, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section, are described in the indicated sections.

- Containment Spray (CS) System (Section 2.3.2.1)
- Safety Injection (SI) System (Section 2.3 2 2)
- Plant Specific System (Section 2 3 2 X)

The methodology used for performing aging management reviews including the process for identifying the aging effects requiring management is explained in Appendix C, Aging Management Review Methodology.

A listing of the abbreviations used in this section is provided in Section 1 4 1.

Table 3 2 1: Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features, provides the summary of the programs evaluated in NUREG-1801 for the Engineered Safety Features Systems component groups that are relied on for license renewal.

This table uses the format suggested by the NRC Standard Review Plan for License Renewal (NUREG-1800) with the addition of a unique item number for each component group, such that cross-referencing can occur between Chapter 3 tables, and a discussion column for clarifications or explanations

Note that this table only includes those component groups that are applicable to a PWR.

MATERIALS

The materials of construction of a component have a major influence on the evaluation of aging effects applicable to the component. Sources of information used to identify materials of construction include original equipment specifications, vendor technical manuals and drawings, fabrication drawings, piping line specifications, modification design records and field walkdowns/verifications. The summary tables indicate the materials of construction for the ESF system components requiring an aging management review.

ENVIRONMENT

The environment to which a component is exposed is critical in the determination of potential aging mechanisms and effects. A review of plant design documentation was performed to quantify the environmental conditions to which the ESF system equipment is exposed. This review identified that some equipment is exposed to a variety of environments. Since aging mechanisms and effects will be primarily driven by the environmental conditions to which equipment is exposed on a daily basis, under normal operating conditions, these conditions will differ from the design parameters which are established based upon the worst case scenario (e.g., LOCA conditions). The service environments are detailed in Table 3 0-1: Internal Service Environments and Table 3 0-2: External Service Environments.

AGING EFFECTS REQUIRING MANAGEMENT

After the components requiring aging management review were identified and grouped by materials of construction and environment, a review of industry and plant-specific operating experience was performed. The purpose of this review was to assure that all applicable aging effects were identified, and to evaluate the effectiveness of existing aging management programs.

OPERATING EXPERIENCE

The aging effects for the ESF systems have been identified for aging management review and evaluated based on the information presented in ***Appendix C ***. This information has been developed using accepted industry standards, reference materials, and industry operating experience such as INPO component reliability data and NRC generic communications. Evaluation of the applicable aging effects and mechanisms required that plant-specific operating experience be considered. To support this plant-specific operating experience review, the AMR process utilizes sources such as the Corrective Action Program, Licensee Event Reports (LER), and interviews with plant personnel to ensure that no aging effects or mechanisms have been overlooked.

3.2.2 RESULTS

The following tables summarize the results of the aging management review for systems in the ESF system group. The tables provide the following information related to each component type: (1) the intended function, (2) the material, (3) the environment, (4) the aging effects requiring management, (5) applicable GALL item references, (6) applicable SRP-LR item references (SRP item indexed to the applicable row number in table 3.2.1, if the aging management program identified in Table 3.2.1 will be used), (7) aging management programs and (8) standard and plant-specific notes.

Table 3 2 2-1: Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Table 3 2 2-2: Engineered Safety Features - Containment Isolation System - Summary of Aging Management Evaluation

Table 3 2 2-2: Engineered Safety Features - Safety Injection System - Summary of Aging Management Evaluation

Table 3.2.2-X: Engineered Safety Features - Plant Specific System - Summary of Again Management Evaluation

3 2.2.1 AGING MANAGEMENT PROGRAMS THAT ARE RELIED ON FOR LICENSE RENEWAL

The following aging management programs manage the aging effects for the ESF systems components.

- General Condition Monitoring
- Work Control Process
- Inservice Inspection Program - Systems, Components and Supports
- Chemistry Control Program for Primary Systems
- Chemistry Control Program for Secondary Systems
- Boric Acid Corrosion Surveillance
- Flow Accelerated Corrosion
- Infrequently Accessed Area Inspection Activities

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstrations provided in Appendix B, the effects of aging associated with the ESF systems components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3 2.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Engineered Safety Features Systems, those programs are addressed in the following sections.

3.2 2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4 3.

3.2.2.2.2 Loss of Material due to General Corrosion

Typically, general corrosion is managed the Chemistry Control Program for Primary Systems, supplemented by the Work Control Process. In certain instances, the Tank Inspection program inspections and Infrequently Accessed Area Inspection Activities also manage these aging mechanisms.

3.2.2.2.3 Local Loss of Material due to Pitting and Crevice Corrosion

In general, crevice and pitting corrosion is managed via the Chemistry Control Program for Primary Systems, supplemented by the Work Control Process In certain instances, the Tank Inspection program inspections and Infrequently Accessed Area Inspection Activities also manage these aging mechanisms.

3.2.2.2.4 Local Loss of Material due to Microbiologically Influenced Corrosion

Microbiologically influenced corrosion (MIC) can occur in carbon steel or stainless steel that is in raw or treated water. Credit is given to the Chemistry Control Program for Primary Systems and Chemistry Control Program for Secondary Systems, supplemented by the Work Control Process, with the management of MIC in treated water systems. MIC is managed in the normally isolated Containment isolation valves and the piping in the service water system (raw water) with the Service Water System (Open-Cycle Cooling Water) inspections and the Work Control Process.

The Work Control Process provides the opportunity to visually inspect the internal surfaces of components and adjoining piping during preventive and corrective maintenance activities, and to correct any identified deficiencies promptly. The process supports various mitigation activities and allows for periodic sampling and trending of component conditions.

Therefore, the current aging management programs successfully manage MIC in Containment isolation valves and piping.

3.2.2.2.5 Changes in Properties due to Elastomer Degradation

Changes in properties due to elastomer degradation could occur in seals associated with various systems, including those with ductwork and filters. Generally, the Work Control Process manages elastomer degradation. For certain specific cases, the Environmental Qualification Program manages this aging effect.

3.2.2.2.6 Local Loss of Material due to Erosion

In general, the Flow Accelerated Corrosion Program manages the loss of material due to erosion. In specific cases, the Fire Protection Program and the Service Water System (Open-Cycle Cooling Water) inspections manage this aging effect.

3.2.2.2.7 Buildup of Deposits due to Corrosion

In general, the buildup of deposits due to corrosion is managed by the Chemistry Control Program for Primary Systems (for primary systems) and the Chemistry Control Program for Secondary Systems (for all other systems). In many cases, however, this aging effect is also managed by the Work Control Process. since this aging effect may also be experienced in portions of the Service Water system, the Service Water System (Open-Cycle Cooling Water) inspections are also credited with managing this aging effect.

3.2.2.3 TIME-LIMITED AGING ANALYSIS

The time-limited aging analyses (TLAA) identified below are associated with the ESF systems components. The section of the LRA that contains the TLAA review results is indicated in parenthesis.

- Fatigue (Section 4 3, Metal Fatigue)
- Leak-before break (Section 4 7 3, Leak-Before-Break)

3.2.3 CONCLUSION

The ESF systems piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The materials, environments, and aging effects have been evaluated using the AMR process described in ***Appendix C *** The aging management program selected to manage aging effects for the period of extended operation are appropriate for the functions which the components perform.

SECTION 3.2 REFERENCES

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3 2 1- 01	Piping, fittings, and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA (see Subsection 3.2.2.2.1)	Low temperature systems are not susceptible to cumulative fatigue damage, for example, core flood.
3 2 1- 03	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to general corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.2 2)	Not applicable, as carbon steel is not used for these components.
3.2.1- 05	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.3.2)	Applicable to containment isolation components only.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 06	Containment isolation valves and associated piping	Loss of material due to microbiologically influenced corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.4)	[Later - containment isolation has not yet been evaluated.]
3.2.1- 08	High pressure safety injection (charging) pump miniflow orifice	Loss of material due to erosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.6)	Not applicable. HPSI and LPSI pumps are not normally in use. The charging pumps are used for makeup.
3.2.1- 09 [NUREG -1801 only]	External surface of carbon steel components	Loss of material due to general corrosion	Plant specific	Yes, plant specific	System Walkdown and Boric Acid Corrosion programs are credited. See Appendix B.
3.2.1- 10	Piping and fittings of CASS in emergency core cooling system	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	Not applicable as this material is not used for these components.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 11	Components serviced by open-cycle cooling system	Local loss of material due to corrosion and/or buildup of deposit due to biofouling	Open-cycle cooling water system	No	Heat Exchanger Monitoring, Water Chemistry Control, and/or System Testing programs are credited See Appendix B for program descriptions.
3.2.1- 12	Components serviced by closed-cycle cooling system	Loss of material due to general, pitting, and crevice corrosion	Closed-cycle cooling water system	No	Water Chemistry Control, Heat Exchanger Monitoring, and/or Metal Fatigue TLAA are credited. See Appendix B for program descriptions.
3.2.1-14	Pumps, valves, piping, and fittings in containment spray and emergency core cooling systems	Crack initiation and growth due to SCC	Water chemistry	No	Not applicable for systems where temperature is below threshold for cracking. Consistent with NUREG-1801 where applicable
3.2.1-16	Carbon steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Consistent with NUREG-1801.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-17	Closure bolting in high pressure or high temperature systems	Loss of material due to general corrosion, loss of preload due to stress relaxation, and crack initiation and growth due to cyclic loading or SCC	Bolting integrity	No	[Later Vol. 2 line items are V.E.2-a and V.E.2-b, both carbon steel in air, moisture, humidity, and leaking fluid. Phrase "loss of preload due to stress relaxation" is only in SRP, not in GALL aging effects.]

Example

Table 3.2.1

Summary of Aging Management Programs for Engineered Safety Features Evaluated in Chapter V of the GALL Report

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-01	Piping, fittings, and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA (see Subsection 3.2.2.2.1)	Low temperature systems are not susceptible to cumulative fatigue damage, for example, core flood.
3.2.1-02	BWR only				
3.2.1-03	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to general corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.2.2)	Not applicable to Plant Y as carbon steel is not used for these components.
3.2.1-04	BWR only				
3.2.1-05	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.3.2)	[Later – containment isolation has not yet been evaluated.]
3.2.1-06	BWR only				
3.2.1-07	Containment isolation valves and associated piping	Loss of material due to microbiologically influenced corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.4)	[Later – containment isolation has not yet been evaluated.]
3.2.1-08	High pressure safety injection (charging) pump miniflow orifice	Loss of material due to erosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.6)	Not applicable as HPSI and LPSI pumps are not normally in use. The charging pumps are used for makeup.
3.2.1-09	BWR only				

Table 3.2.2-1 Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Bolting	Pressure boundary	Carbon steel	Air (external)	Loss of material	VA.1-b VA.3-b VA.4-b VA.5-b VA.6-d (A.6.5)	3.2.1-17	Boric acid corrosion	1
				Loss of material	VE.1-b	3.2.1- 10	System walkdown	1
				Loss of mechanical closure integrity			Boric acid corrosion System walkdown	5
		Stainless steel	Air (external)	None			None	4
Eductor	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A

Table 3.2.2-1 Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Heat exchangers (shell)	Pressure boundary	Carbon steel	Air, borated water leakage (external)	Loss of material	VA.6-d	3.2.1-17	Boric acid corrosion	1
				Loss of material	VE.1-b	3.2 1- 10	System walkdown	1
			Raw water (fresh) (internal)	Loss of material	VA.6-a	3.2.1- 12	Heat exchanger monitoring Water chemistry control	1
			Treated water (internal)	Loss of material	VA.6-c	3.2.1- 13	Water chemistry control	1

Table 3.2.2-1 Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Heat exchanger (tubes)	Heat transfer	Stainless steel	Raw water (fresh) (external)	Fouling	VA.6-b	3.2.1- 12	System testing Water chemistry control	1, B
			Treated water (external)	Fouling			Water chemistry control	B
			Treated water (borated) (internal)	Fouling			Water chemistry control	B
	Pressure boundary	Stainless steel	Raw water (fresh) (external)	Loss of material	VA.6-a	3.2.1- 12	Water chemistry control	1
				Loss of material -- wear			Heat exchanger monitoring	5
			Treated water (external)	Loss of material	VA.6-c	3.2.1- 13	Heat exchanger monitoring	1
				Loss of material - wear			Water chemistry control	
			Treated water (borated) (internal)	Loss of material	VA.6-a VA.6-c	3.2.1- 12 3 2.1- 13	Water chemistry control	1, C

Table 3.2.2-1 Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Heater housing (RWT freeze protection)	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A
Manifold (piping)	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A
Orifice	Flow control Pressure boundary	Stainless steel	Air (external and internal)	None			None	4
	Pressure boundary	Stainless steel	Air (external and internal)	None			None	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A

Table 3.2.2-1 Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Piping	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Air (internal)	None			None	4
			Nitrogen (internal)	None			None	4
			Sodium hydroxide (internal)	Cracking			Inservice inspection	4
				Loss of material			Water chemistry control	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A
Pump casing	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Treated water (borated) (internal)	Loss of material[1]			Water chemistry control	5, A
Spray nozzles	Flow control Pressure boundary	Stainless steel	Air (external and internal)	None			None	4

Table 3.2.2-1 Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Tanks	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Concrete (external)	None			None	4
			Sodium hydroxide (internal)	Cracking			Inservice inspection	4
				Loss of material			Water chemistry control	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5
Thermowells	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Sodium hydroxide (internal)	Cracking			Inservice inspection	4
				Loss of material			Water chemistry control	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A
Tubing	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5, A

Table 3.2.2-1 Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Valve	Pressure boundary	Stainless steel	Air (external)	None			None	4
			Air (internal)	None			None	4
			Nitrogen (internal)	None			None	4
			Sodium hydroxide (internal)	Cracking			Inservice Inspection	4
				Loss of material			Water chemistry control	4
			Treated water (borated) (internal)	Loss of material			Water chemistry control	5,A

Table 3.2.2-2 Engineered Safety Features - Safety Injection System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Valves Piping	Pressure boundary	Carbon steel	Nitrogen	None			None	4
			Ambient air	Loss of material	E.1-b	3.2.1- 10	System walkdown	1
Valves Piping	Pressure boundary	Stainless steel	Nitrogen	None			None	4
			Ambient air	None			None	4
Valves	Pressure boundary	Stainless steel	Treated water (borated)	Cracking	D1.4-b	3.2.1-15	Water chemistry control	
				Loss of material				5
			Ambient air	None			None	4
Piping	Pressure boundary	Stainless steel	Treated water (borated)	Cracking	D1.1-a	3.2.1-15	Water chemistry control	1
				Loss of material				5
			Ambient air	None			None	4
Tubing	Pressure boundary	Stainless steel	Treated water (borated)	Cracking	D1.1-a	3.2.1-15	Water chemistry control	2
				Loss of material				5
			Ambient air	None			None	4

Table 3.2.2-2 Engineered Safety Features - Safety Injection System - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	GALL Item	SRP-LR Item	Aging Management Programs	Notes
Thermowells	Pressure boundary	Stainless steel	Treated water (borated)	Cracking	D1.1-a	3.2.1-15	Water chemistry control	2
				Loss of material				5
			Ambient air	None			None	4

Notes for Tables 3.2.2-1 through 3.2.2-X

1. Consistent with NUREG-1801 item for component, material, environment, aging effect and aging management program
2. Component is different, but consistent with NUREG-1801 item for material, environment, aging effect and aging management program.
3. Material not in NUREG-1801 for this component.
4. Environment not in NUREG-1801 for this component and material.
5. Aging effect not in NUREG-1801 for this component, material, and environment combination.

Plant-specific notes:

A The system temperature is below the threshold for cracking

B. Fouling is not restricted to biofouling only.

C NUREG-1801 differentiates between open and closed systems; however, both have borated water internally.

D. Material, environment and aging effect are consistent with NUREG-1801, but a different aging management program is used.

E. Component type, material, environment and aging effect combination not in NUREG-1801, but aging management program in NUREG-1801 is used

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEM

3.4.1 SCOPE

3.4.2 RESULTS

3.4.2.1 AGING MANAGEMENT PROGRAMS THAT ARE RELIED ON FOR LICENSE RENEWAL

The following aging management programs manage the aging effects for the steam and power conversion system components.

-

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstrations provided in Appendix B, the effects of aging associated with the steam and power conversion system components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.4.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Steam and Power Conversion System, those programs are addressed in the following sections.

3.4.3 CONCLUSION

SECTION 3.4 REFERENCES

3.5 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEM

3.5.1 SCOPE

3.5.2 RESULTS

3.5.2.1 AGING MANAGEMENT PROGRAMS THAT ARE RELIED ON FOR LICENSE RENEWAL

The following aging management programs manage the aging effects for the steam and power conversion system components.

-

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstrations provided in Appendix B, the effects of aging associated with the steam and power conversion system components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.5.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Steam and Power Conversion System, those programs are addressed in the following sections.

3.5.3 CONCLUSION

SECTION 3.5 REFERENCES

3.6 AGING MANAGEMENT OF ELECTRICAL AND INSTRUMENTATION AND CONTROLS

3.6.1 SCOPE

3.6.2 RESULTS

3.6.2.1 AGING MANAGEMENT PROGRAMS THAT ARE RELIED ON FOR LICENSE RENEWAL

The following aging management programs manage the aging effects for the electrical and instrumentation and controls systems and components.

-

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstrations provided in Appendix B, the effects of aging associated with the electrical and instrumentation and controls systems and components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.6.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the electrical and instrumentation and controls systems and components, those programs are addressed in the following sections.

3.6.3 CONCLUSION

SECTION 3.6 REFERENCES

- The purpose of the HPSI subsystem is to inject treated water into the reactor coolant system in the event of a small pipe break in the reactor coolant system or a main steam line break. The HPSI subsystem maintains reactor coolant system pressure if the leakage rate is less than the combined injection rate of the HPSI pumps.
- The purpose of the LPSI subsystem is to inject large quantities of treated water into the reactor coolant system in the event of a large break in the reactor coolant pressure boundary.
- The purpose of the SIT is to provide rapid refilling of the lower reactor core plenum in the event of a large break in the reactor coolant system. Each SIT is pressurized with nitrogen and filled to a preset level with treated water. If the reactor coolant system pressure falls below the SIT pressure during power operation, the treated water is injected into the reactor coolant system. The SITs are passive components in the safety injection system. They fulfill their purpose without operator action, component repositioning, or electrical power.

The following SI system component groups contain some components within the Class 1 pressure boundary:

- Piping
- Valves

The portions of the SI system containing components subject to an AMR extend from the RWST and Containment Sump system piping, through the safety injection pumps, and into the reactor coolant system.

<u>FSAR References</u>

Additional details of the SI system can be found in the FSAR, Section 6.3.

<u>License Renewal Drawings</u>

The license renewal drawings for the SI system are listed below:

25203-LR26009, Sh.6
25203-LR26015, Sh.1
25203-LR26015, Sh.2
25203-LR26015, Sh.3
25203-LR26017, Sh.1

Components Subject to AMR

The component types that require aging management review are indicated in Table 2.3.2-2, Engineered Safety Features - Containment Spray System.

Table 2.3.2-2 Engineered Safety Features - Containment Spray System

Component Type	Intended Function
Valves Piping	Pressure boundary
Valves Piping	Pressure boundary
Valves	Pressure boundary
Piping	Pressure boundary
Tubing	Pressure boundary
Thermowells	Pressure boundary

2.3.2.X PLANT SPECIFIC SYSTEM

System Description

FSAR References

Additional details of the **** System**** can be found in the FSAR, Section 6.2.

License Renewal Drawings

The license renewal drawings for the **** System **** are listed below:

Components Subject to AMR

The component types that require aging management review are indicated in Table 2.3.2-X, Engineered Safety Features - Containment Spray System.

Table 2.3.2-X Engineered Safety Features - Containment Spray System

Component Type	Intended Function

3.0 AGING MANAGEMENT REVIEW RESULTS

This section provides the results of the aging management review for those structures and components identified in Section 2.0 as being subject to aging management review. The methodology used for performing aging management reviews including the process for identifying the aging effects requiring management is explained in Appendix C, Aging Management Review Methodology.

Descriptions of the internal and external service environments which were used in the aging management review to determine aging effects requiring management are included in Table 3.0-1: Internal Service Environments and Table 3.0-2: External Service Environments. The environments used in the aging management reviews are listed in the Environment column and details related to the environment are provided in the Description column of these tables.

A listing of the abbreviations used in these tables is provided in Section 1.4.1.

Table 3.0-1 Internal Service Environments

Environment	Description
Air	Dry/filtered compressed air (identified as Dry Air), non-dried compressed air, and atmospheric air (when internal to components such as ventilation system components, components open to atmosphere, etc.). Moisture-laden air conditions are noted, when applicable.
Gas	Nitrogen, oxygen, hydrogen, carbon dioxide, helium, freon, or Halon gases. Also includes vent gases from process systems.
Lubricating Oil	All lubricating oils used for in-scope plant equipment.
Fuel Oil	All fuel oils used for in-scope plant equipment.
Raw Water[1]	From a river, lake, pond, or groundwater source. Raw water is not demineralized or chemically treated to any significant extent. In general, raw water is rough filtered to remove large particles. Biocides may be added to raw water to control micro-organisms or macro-organisms. Other designations of raw water include water that leaks from any system and condensation.
Sea Water[1]	Water from a bay, sound, or ocean source. Sea water is not demineralized or chemically treated to any significant extent. In general, sea water is rough filtered to remove large particles. Biocides may be added to sea water to control micro-organisms or macro-organisms.

Table 3.0-1 Internal Service Environments

Environment	Description
Treated water[1] Steam	Demineralized water or chemically purified water which is the source for water that may require further processing, such as for the primary or secondary coolant system. Treated water can be de-aerated, can include corrosion inhibitors, biocides, or boric acid, or can include a combination of treatments. Steam generated from treated water is included in this environment category. Examples of designations that are used to identify treated water in the Environment description sections of the aging management review results include: • treated water (borated water) - applies to primary systems water that is treated and monitored for quality under Primary Water Chemistry Aging Management Activity • treated water (component cooling) - applies to component cooling system water that is treated and monitored for quality under Closed-Cycle Cooling Water System Aging Management Activity • treated water (bearing cooling/chilled water) - applies to bearing cooling system and chilled water system water that is treated and monitored for quality under Closed-Cycle Cooling Water System Aging Management Activity • treated water (diesel cooling) - applies to local, self-contained diesel engine cooling water systems water that is treated and monitored for quality under Closed-Cycle Cooling Water System Aging Management Activity • treated water (secondary) - applies to secondary systems water that is within the scope of the Secondary Water Chemistry Aging Management Activity and controlled for protection of steam generators Other treated water applications use chemistry-controlled treated water as source water, but the water is not maintained as chemistry-controlled water.

1. While these are considered internal environments for plant systems, they may also be identified as external environments for certain structural members and system components that are submerged.

Table 3.0-2 External Service Environments

Environment[1]	Description
Air	Indoor air environments as described below: <u>Sheltered Air</u> - The sheltered air environment includes atmospheric air inside covered structures that provide protection from precipitation and wind. This environment is defined by a bulk average air temperature range of 40°F to 130°F and a 60-year maximum design ionizing dose of $3x10^7$ rads. <u>Containment Air</u> - The Containment air environment is defined by a bulk average air temperature range of 105°F to 120°F, except the pressurizer block house which can approach 150°F. Normal operating pressure is between -12 in. w.g. and 1.0 psig. The 60-year maximum design ionizing dose ranges between $6.6x10^5$ rads and $8.7x10^7$ rads. An exception is the area around the reactor vessel inside the primary shield wall for which the 60-year maximum design ionizing dose is $X.Xx10^9$ rads. <u>NOTES</u> 1.Certain structures or components may experience environmental conditions that deviate from the stated ranges or maximum values. The actual environmental condition(s) for these structures or components were used in the aging evaluation when the condition could affect the results, and, in those cases, the actual values are identified in the Environment description of the applicable LRA subsection. 2.Structural members may be associated with mechanical system components that may have the potential for condensation or intermittent wetting. Therefore, structural members have been conservatively assumed to be intermittently wetted in an air environment. 3.Mechanical components are assumed to be in an air environment that is not subject to intermittent wetting. Intermittently wetted conditions are noted, when applicable, such as from condensation.
Atmosphere / Weather	Air environment outside covered structures which includes precipitation and wind. Components and structures in this environment are subject to intermittent wetting. The outdoor air environment also includes exposure to ultraviolet radiation and ozone. This environment is bounded by a bulk average air temperature range of -5.1°F to 91°F and a 60-year maximum design ionizing dose of less than 150 rads.

Table 3.0-2 External Service Environments

Environment[1]	Description
Borated Water Leakage	The borated water leakage environment applies in all plant areas that include components and systems that contain borated water and that could leak on nearby components or structures. This environment is specified in the aging management review results only for materials susceptible to boric acid corrosion (carbon steel, low-alloy steels, and copper alloys). This environment is not considered for in-scope cables and connectors since cables are insulated, splices are sealed, and terminations are protected by enclosures.
Soil	The external environment for structures and components buried in the ground. Buried components (pipes and valves) are exposed to a soil environment and may be exposed to groundwater if they are located below the local groundwater elevation. The soil is assumed to entrain raw water and buried components are evaluated for the effects of corrosion. Concrete structural members below grade elevation are exposed to a soil environment and may be exposed to groundwater if they are located below the local groundwater elevation. The site groundwater is non-aggressive to concrete as determined by recent groundwater analyses (discussed in Appendix C). Steel piles are driven in undisturbed soil such that the soil environment surrounding the piles is deficient in oxygen at depths of a few feet below grade or below the water table. Therefore, the soil environment is not considered corrosive to steel piles (Reference 3.6-2, Section 3.5).

1. For certain structural members and system components that are submerged, the applicable environment identified in Table 3.0-1: Internal Service Environments, is specified in the aging management review results.

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES SYSTEMS

3.2.1 SCOPE

This section provides the results of the aging management review for those components identified in Section 2.3.2, Engineered Safety Features Systems, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section, are described in the indicated sections.

- Containment Spray (CS) System (Section 2.3.2.1)
- Safety Injection (SI) System (Section 2.3.2.2)
- Plant Specific System (Section 2.3.2.X)

The methodology used for performing aging management reviews including the process for identifying the aging effects requiring management is explained in Appendix C, Aging Management Review Methodology.

A listing of the abbreviations used in this section is provided in Section 1.4.1.

Table 3.2.1: Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features, provides the summary of the programs evaluated in NUREG-1801 for the Engineered Safety Features Systems component groups that are relied on for license renewal.

This table uses the format suggested by the NRC Standard Review Plan for License Renewal (NUREG-1800) with the addition of a unique item number for each component group, such that cross-referencing can occur between Chapter 3 tables, and a discussion column for clarifications or explanations.

Note that this table only includes those component groups that are applicable to a PWR.

MATERIALS

The materials of construction of a component have a major influence on the evaluation of aging effects applicable to the component. Sources of information used to identify materials of construction include original equipment specifications, vendor technical manuals and drawings, fabrication drawings, piping line specifications, modification design records and field walkdowns/verifications. The summary tables indicate the materials of construction for the ESF system components requiring an aging management review.

ENVIRONMENT

The environment to which a component is exposed is critical in the determination of potential aging mechanisms and effects. A review of plant design documentation was performed to quantify the environmental conditions to which the ESF system equipment is exposed. This review identified that some equipment is exposed to a variety of environments. Since aging mechanisms and effects will be primarily driven by the environmental conditions to which equipment is exposed on a daily basis, under normal operating conditions, these conditions will differ from the design parameters which are established based upon the worst case scenario (e.g., LOCA conditions). The service environments are detailed in Table 3.0-1: Internal Service Environments and Table 3.0-2: External Service Environments.

AGING EFFECTS REQUIRING MANAGEMENT

After the components requiring aging management review were identified and grouped by materials of construction and environment, a review of industry and plant-specific operating experience was performed. The purpose of this review was to assure that all applicable aging effects were identified, and to evaluate the effectiveness of existing aging management programs.

OPERATING EXPERIENCE

The aging effects for the ESF systems have been identified for aging management review and evaluated based on the information presented in ***Appendix C ***. This information has been developed using accepted industry standards, reference materials, and industry operating experience such as INPO component reliability data and NRC generic communications. Evaluation of the applicable aging effects and mechanisms required that plant-specific operating experience be considered. To support this plant-specific operating experience review, the AMR process utilizes sources such as the Corrective Action Program, Licensee Event Reports (LER), and interviews with plant personnel to ensure that no aging effects or mechanisms have been overlooked.

3.2.2 RESULTS

The following tables summarize the results of the aging management review for systems in the ESF system group. The tables provide the following information related to each component type: (1) the intended function, (2) the material, (3) the environment, (4) the aging effects requiring management, (5) applicable GALL item references, (6) applicable SRP-LR item references (SRP item indexed to the applicable row number in table 3.2.1, if the aging management program identified in Table 3.2.1 will be used), (7) aging management programs and (8) standard and plant-specific notes.

Table 3.2.2-1: Engineered Safety Features - Containment Spray System - Summary of Aging Management Evaluation

Table 3.2.2-2: Engineered Safety Features - Safety Injection System - Summary of Aging Management Evaluation

Table 3.2.2-X: Engineered Safety Features - Plant Specific System - Summary of Again Management Evaluation

3.2.2.1 AGING MANAGEMENT PROGRAMS THAT ARE RELIED ON FOR LICENSE RENEWAL

The following aging management programs manage the aging effects for the ESF systems components.

- General Condition Monitoring
- Work Control Process
- Inservice Inspection Program - Systems, Components and Supports
- Chemistry Control Program for Primary Systems
- Chemistry Control Program for Secondary Systems
- Boric Acid Corrosion Surveillance
- Flow Accelerated Corrosion
- Infrequently Accessed Area Inspection Activities

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstrations provided in Appendix B, the effects of aging associated with the ESF systems components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

3.2.2.2 FURTHER EVALUATION OF AGING MANAGEMENT AS RECOMMENDED BY NUREG-1801

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation in the license renewal application. For the Engineered Safety Features Systems, those programs are addressed in the following sections.

3.2.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.3.

3.2.2.2.2 Loss of Material due to General Corrosion

Typically, general corrosion is managed the Chemistry Control Program for Primary Systems, supplemented by the Work Control Process. In certain instances, the Tank Inspection program inspections and Infrequently Accessed Area Inspection Activities also manage these aging mechanisms.

3.2.2.2.3 Local Loss of Material due to Pitting and Crevice Corrosion

In general, crevice and pitting corrosion is managed via the Chemistry Control Program for Primary Systems, supplemented by the Work Control Process. In certain instances, the Tank Inspection program inspections and Infrequently Accessed Area Inspection Activities also manage these aging mechanisms.

3.2.2.2.4 Local Loss of Material due to Microbiologically Influenced Corrosion

Microbiologically influenced corrosion (MIC) can occur in carbon steel or stainless steel that is in raw or treated water. Credit is given to the Chemistry Control Program for Primary Systems and Chemistry Control Program for Secondary Systems, supplemented by the Work Control Process, with the management of MIC in treated water systems. MIC is managed in the normally isolated Containment isolation valves and the piping in the service water system (raw water) with the Service Water System (Open-Cycle Cooling Water) inspections and the Work Control Process.

The Work Control Process provides the opportunity to visually inspect the internal surfaces of components and adjoining piping during preventive and corrective maintenance activities, and to correct any identified deficiencies promptly. The process supports various mitigation activities and allows for periodic sampling and trending of component conditions.

Therefore, the current aging management programs successfully manage MIC in Containment isolation valves and piping.

3.2.2.2.5 Changes in Properties due to Elastomer Degradation

Changes in properties due to elastomer degradation could occur in seals associated with various systems, including those with ductwork and filters. Generally, the Work Control Process manages elastomer degradation. For certain specific cases, the Environmental Qualification Program manages this aging effect.

3.2.2.2.6 Local Loss of Material due to Erosion

In general, the Flow Accelerated Corrosion Program manages the loss of material due to erosion. In specific cases, the Fire Protection Program and the Service Water System (Open-Cycle Cooling Water) inspections manage this aging effect.

3.2.2.2.7 Buildup of Deposits due to Corrosion

In general, the buildup of deposits due to corrosion is managed by the Chemistry Control Program for Primary Systems (for primary systems) and the Chemistry Control Program for Secondary Systems (for all other systems). In many cases, however, this aging effect is also managed by the Work Control Process. since this aging effect may also be experienced in portions of the Service Water system, the Service Water System (Open-Cycle Cooling Water) inspections are also credited with managing this aging effect.

3.2.2.3 TIME-LIMITED AGING ANALYSIS

The time-limited aging analyses (TLAA) identified below are associated with the ESF systems components. The section of the LRA that contains the TLAA review results is indicated in parenthesis.

- Fatigue (Section 4.3, Metal Fatigue)
- Leak-before break (Section 4.7.3, Leak-Before-Break)

3.2.3 CONCLUSION

The ESF systems piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The materials, environments, and aging effects have been evaluated using the AMR process described in ***Appendix C ***. The aging management program selected to manage aging effects for the period of extended operation are appropriate for the functions which the components perform.

Results Tables: Engineered Safety Features

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 01	Piping, fittings, and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA (see Subsection 3.2.2.2.1)	Low temperature systems are not susceptible to cumulative fatigue damage, for example, core flood.
3.2.1- 03	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to general corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.2.2)	Not applicable, as carbon steel is not used for these components.
3.2.1- 05	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.3.2)	Applicable to containment isolation components only.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 06	Containment isolation valves and associated piping	Loss of material due to microbiologically influenced corrosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.4)	[Later - containment isolation has not yet been evaluated.]
3.2.1- 08	High pressure safety injection (charging) pump miniflow orifice	Loss of material due to erosion	Plant specific	Yes, plant specific (see Subsection 3.2.2.2.6)	Not applicable. HPSI and LPSI pumps are not normally in use. The charging pumps are used for makeup.
3.2.1- 10 [NUREG -1801 only]	External surface of carbon steel components	Loss of material due to general corrosion	Plant specific	Yes, plant specific	System Walkdown and Boric Acid Corrosion programs are credited. See Appendix B.
3.2.1- 11	Piping and fittings of CASS in emergency core cooling system	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	Not applicable as this material is not used for these components.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1- 12	Components serviced by open-cycle cooling system	Local loss of material due to corrosion and/or buildup of deposit due to biofouling	Open-cycle cooling water system	No	Heat Exchanger Monitoring, Water Chemistry Control, and/or System Testing programs are credited. See Appendix B for program descriptions.
3.2.1- 13	Components serviced by closed-cycle cooling system	Loss of material due to general, pitting, and crevice corrosion	Closed-cycle cooling water system	No	Water Chemistry Control, Heat Exchanger Monitoring, and/or Metal Fatigue TLAA are credited. See Appendix B for program descriptions.
3.2.1-15	Pumps, valves, piping, and fittings in containment spray and emergency core cooling systems	Crack initiation and growth due to SCC	Water chemistry	No	Not applicable for systems where temperature is below threshold for cracking. Consistent with NUREG-1801 where applicable
3.2.1-17	Carbon steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Consistent with NUREG-1801.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-18	Closure bolting in high pressure or high temperature systems	Loss of material due to general corrosion, loss of preload due to stress relaxation, and crack initiation and growth due to cyclic loading or SCC	Bolting integrity	No	[Later Vol. 2 line items are V.E.2-a and V.E.2-b, both carbon steel in air, moisture, humidity, and leaking fluid. Phrase "loss of preload due to stress relaxation" is only in SRP, not in GALL aging effects.]

CLASS OF '02
GALL/SRP APPLICATIONS
LESSONS LEARNED

1. "IS CONSISTENT WITH" - WHAT DOES IT MEAN?

   SAME COMPONENT, MATERIAL, ENVIRONMENT, AND AGING EFFECT AS EVALUATED IN GALL REPORT

   GLOBAL CHANGES TO AGING MANAGEMENT APPROACH IDENTIFIED IN TABLE 1

   COMPONENT-SPECIFIC CHANGES TO AGING MANAGEMENT APPROACH IDENTIFIED IN TABLE 2

2. DIALOG EARLY WITH STAFF ON FIRE PROTECTION SCOPING

3. EACH DEVIATION FROM GALL SHOULD BE CLEARLY DEFINED, EXPLAINED, AND JUSTIFIED

   THE MORE DEVIATIONS FROM GALL, THE LESS RESOURCE SAVINGS. ADDITIONAL RESOURCES EXPENDED IF RAIs ARE ISSUED

4. ADDRESS ISGs IN THE LRA

5. ADDRESS "HOT" ISSUES

   ACRS - DAVIS BESSE, V.C. SUMMER, PTS AND USE, OVERFLOODING OF UNDERGROUND CABLE VAULTS, BAFFLE BOLT CRACKING, GROUNDWATER MONITORING, AND USE OF ONE-TIME INSPECTIONS FOR BURIED COMPONENTS

6. UNDERSTAND WHAT IS REQUIRED FOR TLAAs

   PROVIDE A MARGINS DISCUSSION (i.e., DISCUSS WHETHER MARGINS PROVIDED DURING CURRENT OPERATING TERM WILL BE MAINTAINED OR REDUCED DURING THE EXTENDED TERM. IF MARGINS ARE REDUCED, BY HOW MUCH?)

   BE PREPARED TO SUBMIT PROPRIETARY INFORMATION

7. IDENTIFY SYSTEM FUNCTIONS

   NOT REQUIRED BY THE RULE

   REVIEWERS ARE TRYING TO DETERMINE IF THE SYSTEM FUNCTION WILL BE MAINTAINED DURING EXTENDED TERM

8. DESCRIBE ENVIRONMENTS (INTERNAL AND EXTERNAL)

   IF THERE ARE DIFFERENT EXTERNAL ENVIRONMENTS, DEFINE THEM

9. IF SYSTEMS ARE REALIGNED, IDENTIFY THEM

10. PROVIDE LRA TABLE OF CONTENTS ~60 DAYS BEFORE SUBMITTAL OF LRA

11. PROVIDE AMP DISTRIBUTION TABLE

12. INCLUDE SIMPLE SYSTEM DESCRIPTIONS

13. DO A CONSISTENCY CHECK BETWEEN SYSTEMS LISTED IN FSAR AND THOSE IN LRA

FOUND SOME SYSTEMS IN FSAR WEREN'T LISTED IN TABLE 2.2-1

14. ENSURE SYSTEM DESCRIPTIONS IN SECTIONS 2 AND 3 ARE CONSISTENT

15. IF GALL OR SRP IDENTIFIES INFORMATION THAT THE APPLICANT SHOULD PROVIDE, LRA SHOULD HAVE THE INFORMATION.

16. IF GALL REFERS TO GUIDANCE THAT IS NOT YET APPROVED BY STAFF, DISCUSS WHAT YOU'LL DO IF ITS NOT APPROVED (SEE XI.M19)

17. X.M1 IS INTENDED TO ADDRESS ENVIRONMENTALLY-ASSISTED FATIGUE, NOT OTHER ASPECTS OF FATIGUE MONITORING. ALSO, XI.M19 ADDRESSES STEAM GENERATOR TUBE INTEGRITY, NOT OTHER SG COMPONENTS.

18. AMP XI.M27, "FIRE WATER SYSTEM," STATES THAT THE AMP APPLIES TO UNDERGROUND PIPING, AMONG OTHER COMPONENTS. HOWEVER, NOWHERE IN THE REMAINDER OF THE AMP DOES IT DISCUSS HOW TO MANAGE UNDERGROUND PIPING.

19. IF YOU HAVE TAKEN EXCEPTIONS TO GENERIC COMMUNICATIONS THAT ARE REFERENCED IN GALL AMPs, NOTE THIS IN LRA AND PROVIDE JUSTIFICATION FOR WHY YOU'RE STILL CONSISTENT WITH GALL AMP.

20. LIST COMPONENTS IN SECTION 2 TABLES AND 3.X-2 TABLES IN ALPHABETICAL ORDER

21. MAKE SURE LINKAGE BETWEEN LRA AND FSAR ON THE CD IS GOOD

FORT CALHOUN STATION
AGING MANAGEMENT PROGRAMS
COMMON (C) AND UNIQUE (U)

LRA Section	AMPs
COMMON AMPs	B.1.1 - Bolting Integrity B.1.2 - Chemistry B.1.3 - Containment ISI B.1.5 - FAC B.1.6 - Inservice Inspection B.2.1 - Boric Acid Corrosion Prevention B.2.2 - Cooling Water Corrosion B.2.4 - Fatigue Monitoring B.2.5 - Fire Protection B.2.7 - Periodic Surveillance and Preventive Maintenance B.2.10 - Structures Monitoring B.3.3 - General Corrosion of External Surfaces B.3.5 - One-Time Inspection B.3.6 - Selective Leaching
3.1 - RCS SYSTEMS	B.1.1 - Bolting Integrity - C B.1.2 - Chemistry - C B.1.5 - FAC - C B.1.6 - Inservice Inspection - C B.1.7 - RV Inspection - U B.2.1 - Boric Acid Corrosion Prevention - C B.2.4 - Fatigue Monitoring - C B.2.8 - RV Internals Insp. - U B.2.9 - Steam Generator - U B.3.1 - Alloy 600 - U B.3.5 - One-Time Inspection - C B.3.7 - Thermal Embrittlement - U
3.2 - ESF SYSTEMS	B.1.1 - Bolting Integrity - C B.1.2 - Chemistry - C B.2.1 - Boric Acid Corrosion Prevention - C B.2.2 - Cooling Water Corrosion - C B.2.7 - Periodic Surveillance and Preventive Maint. - C B.3.3 - General Corrosion of External Surfaces - C B.3.5 - One-Time Inspection - C B.3.6 - Selective Leaching - C

3.3 - AUXILIARY SYSTEMS	B.1.1 - Bolting Integrity - C B.1.2 - Chemistry - C B.2.1 - Boric Acid Corrosion Prevention - C B.2.2 - Cooling Water Corrosion - C B.2.3 - Diesel Fuel Monitoring and Storage - U B.2.5 - Fire Protection - C B.2.6 - Overhead Load Handling Systems Inspection - U B.2.7 - Periodic Surveillance and Preventive Maint. - C B.2.10 - Structures Monitoring - C B.3.2 - Buried Surfaces External Corrosion - U B.3.3 - General Corrosion of External Surfaces - C B.3.5 - One-Time Inspection - C B.3.6 - Selective Leaching - C
3.4 - STEAM AND POWER CONVERSION SYSTEMS	B.1.1 - Bolting Integrity - C B.1.2 - Chemistry - C B.1.5 - FAC - C B.2.1 - Boric Acid Corrosion Prevention - C B.2.2 - Cooling Water Corrosion - C B.2.7 - Periodic Surveillance and Preventive Maint. - C B.3.3 - General Corrosion of External Surfaces - C B.3.5 - One-Time Inspection - C B.3.6 - Selective Leaching - C
3.5 - STRUCTURES	B.1.1 - Bolting Integrity - C B.1.2 - Chemistry - C B.1.3 - Containment ISI - C B.1.4 - Containment Leak Rate - U B.1.6 - Inservice Inspection - C B.2.1 - Boric Acid Corrosion Prevention - C B.2.5 - Fire Protection - C B.2.7 - Periodic Surveillance and Preventive Maint. - C B.2.10 - Structures Monitoring - C B.3.3 - General Corrosion of External Surfaces - C B.3.6 - Selective Leaching - C
3.6 - ELECTRICAL	B.2.1 - Boric Acid Corrosion Prevention - C B.3.4 - Non-EQ Cable aging Management - U
4.3.1 - REACTOR COOLANT AND ASSOCIATED SYSTEM FATIGUE	?
4.3.3 - PZR SURGE LINE THERMAL STRATIFICATION	B.2.4 - Fatigue Monitoring - C
4.3.4 - FATIGUE OF CLASS II and III COMPONENTS	B.2.4 - Fatigue Monitoring - C
4.4 - ENVIRONMENTAL QUALIFICATION	EQ Program?

4.5 - CONCRETE CONTAINMENT TENDON PRE-STRESS	B.1.3 - Containment ISI - C